The backroom
A woodwind repair manual

by John Novack

A series of articles on woodwind repair techniques from issues of the *Leblanc Bell,* G. Leblanc Corporation's corporate newsletter.

Leblanc
Educational publications

John Novack served as an instrument repair technician for the G. Leblanc Corporation for over thirty years before his untimely death in December 1984. Beginning the relationship in 1951, he repaired woodwind instruments as well as restored many antique and unusual musical instruments. John's craftsmanship and knowledge of woodwinds contributed greatly to Leblanc's engineering and production of superior quality wind instruments.

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The G. Leblanc Corporation has compiled this material to aid the unsung heroes of all music retail operations—the repair technician. Since service is the backbone of any business, the goal of this booklet is to assist in improving quality, reducing repair time and satisfying the customer.

It is understood that many of the following procedures are "old hat" to the ingenious men and women in the backroom, but it is hoped that the repair methods employed at Leblanc will be of added assistance.

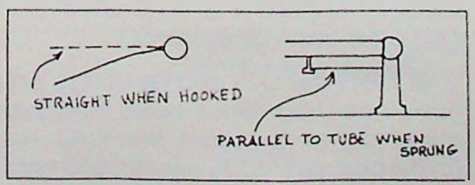
—John Novack

Clarinet Repad and Regulation

The Vito Bb Bass Clarinet (Model 7166) was chosen the first instrument in this repair series because it demonstrates mechanisms common to many other woodwinds. A complete repad job will be the subject of our examination since it covers everything that you will need to know from a simple torn pad replacement to regulating and checking for leaks.

Step 1 in setting up a complete pad job is a general check of the condition of the instrument. Check the joint corks, (bell receiver only on Model 7166, since this is a one-piece instrument with a lock ring at the center joint). Replace joint corks if necessary to insure a snug fit. Examine all keys before disassembly and check for bent or out-of-line cups, spatulas, rods, and tubes. Straighten or line up as necessary and rough-regulate as close as possible with the old pads still in the keys. This will make final regulation with new pads much easier. Check again before disassembly for any lost motion in the mechanisms. You will often find that a worn or missing cork or felt is the root of the problem. Make a mental note of the approximate thickness needed for replacement cork or felt. As a last step before proceeding, check all round and flat springs for proper tension and feel. We are now ready to remove the keys and at this point we will devote the remaining space to the upper joint of the bass clarinet.

Remove all keys, replacing screws in their respective posts. Check the tension and bend of round springs. A properly bent spring is the one most important factor in a live, responsive key.

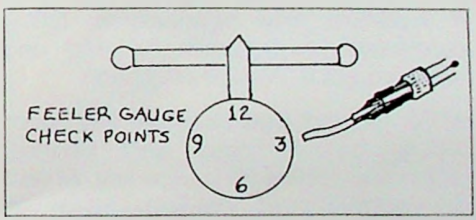


Check all tone holes and octave vent for dirt accumulation and clean if necessary.

As you begin to remove the old pads, let me stress the importance of proper diameter and thickness of the new pads. Pad sets (PS 7166) may be ordered or bulk orders (PN 9-32) can be filled if diameter in 32nds is specified. If a great deal of repair work is done in your shop, bulk quantities are advised.

Heat the pad cup, remove old pad, clean the inside of cup if necessary. Insert just enough shellac (3425) to make the new pad stick. Do not overload the cup since shellac will ooze between the pad and the cup when seating is complete. Repad each cup, leveling the new pad evenly with your finger or a stick, after which each key cork or felt should be inspected.

With all keys repadded, mount the C#/G# (half moon) key. The tension of this key should be quite heavy.



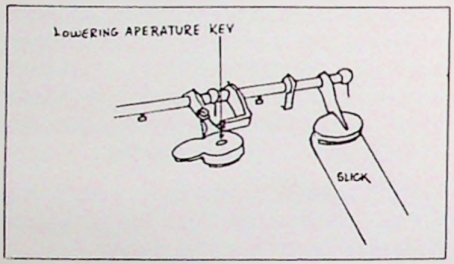
(A) Make sure cup is centered and level. Prick the side of the pad near the cup edge with a needle to relieve captured air. Lightly iron the pad with a warm slick and check with a feeler. Heat the cup and shift pad if necessary to get a light drag at 12, 3, 6, and 9 o'clock.

Moisten pad with a wet slick. Iron with a warm slick. Remoisten pad with a slick. Wedge the key shut and apply heat to the cup. A deep seat is not necessarily a good seat, so do not apply too much heat. The more carefully you have checked the covering with your feeler, the less impression your pad will need.

Mount the Eb/Bb key and repeat (A) Leave all wedges in place as long as possible or until you are ready for regulation.

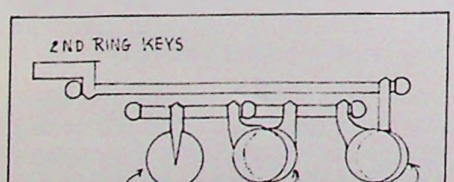
Mount the 1st ring, aperture key with the oiled hinge screw. Apply pivot grease to the Bb bridge key and slip it into place on the bottom pivot screw. Turn the hinge screw all the way into the top of the bridge key and check to make sure that all three keys fall freely with springs unhooked. If free, hook up the springs.

With a feeler, check the aperture key. If it is not closing slightly before the first ring, back out the adjusting screw, place slick under the first ring cup and press down on the aperture key.



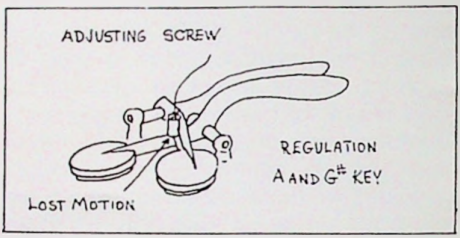
If aperture key now closes, follow procedure (A) for both 1st ring and aperture pads. Wedge and heat.

While 1st ring and aperture keys cool, follow the leveling and seating procedure for the Bb bridge key. While it is wedged and cooling, return to aperture and 1st ring. Remove wedges and check coordination between the two keys with a feeler — using the adjusting screw for fine regulation. Now, mount the D/A key of the second ring —

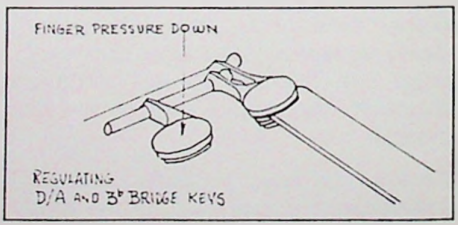


with the oiled hinge screw. Remove wedge for Bb bridge key, and follow pad seating procedure (A) for the D/A key. Heat, wedge or clamp the D/A key.

While the D/A key is cooling, turn your attention to the A and G# keys. Check the bend on the A key flat spring, apply a bit of pivot grease to the end of the spring and mount the key with oiled hinge screw. Again, follow pad seating procedure (A), then wedge closed. Mount G# key and seat. When cool, check coordination between the two keys. When the A key is depressed, there should be a slight amount of lost motion before it picks up the G# key to assure firm closing of the G#. Move the adjusting screw to allow for this lost motion.



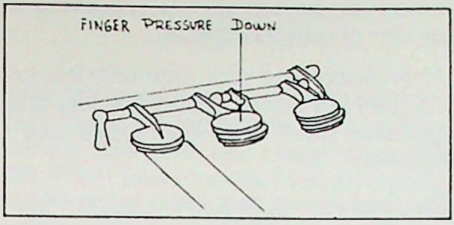
Return to Bb bridge key and D/A key. Remove wedges and with feeler check that both keys close together. If Bb bridge key closes first, place slick between Bb cup and D/A Plateau and press down on D/A cup.



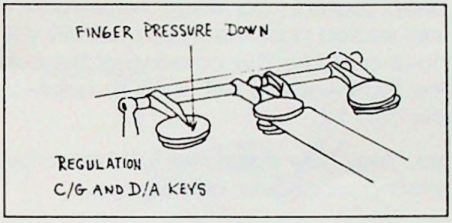
If D/A key closes first, reverse above procedure. (That is — Slick under pad and press down on plateau.)

C/G Key: After D/A and Bb bridge keys have been regulated, back the hinge screw out and mount the C/G key. Follow pad seating A, wedge, and heat.

Regulation of C/G with D/A and Bb bridge key is done in same manner as mentioned above. If C/G pad is being held open, place slick between plateau of C/G and cup of D/A key and press down on C/G cup.



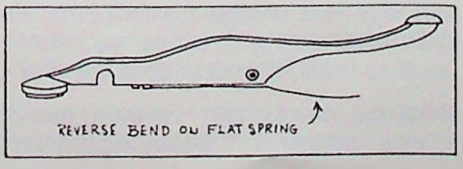
Reverse procedure when C/G cup closes first.

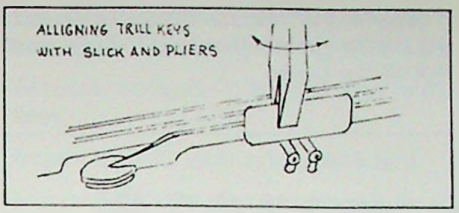


When checking the regulation between two or more open keys such as the second ring or upper stack, always check with feeler paper and minimal amount of finger pressure.

Check travel on C/G key with .035 slick gauge. The slick should slip easily between pad and flat of body. If the travel is too low remove cork from C/G foot with fine sand paper. If travel is too high add or replace with thicker cork to C/G foot.

Trill Keys C, B, F#/C, Eb/Bb are mounted and seated in similar manner to other keys. The only things to be cautious about are proper travel, centering of cup over tone hole and general alignment.



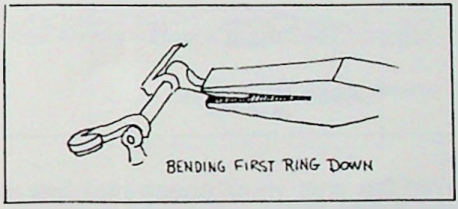


Aligning of trill should always be done before seating.

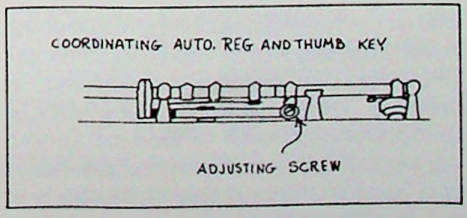
Register Key Mechanism:

Mount Automatic Register Key and Automatic Bb key with oiled hinge screw. Tension on both of these keys should be light. Center and level both cups and seat (A).

Mount thumb key, center and level cup, and seat (A). When cool, remove wedges from register mechanism and thumb key and check coordination between thumb key and first ring. They must close exactly together. If thumb key does not close 1st ring, hold 1st ring cup and bend arm down with pliers.

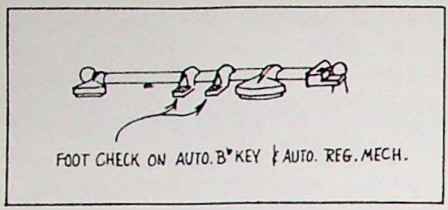


To regulate thumb key with automatic Bb key use adjusting screw on thumb key — turning to close Auto Bb — and turning out to close thumb key. Check closing of both keys with feeler.



Check feet on Automatic Bb key and automatic Register key to make sure

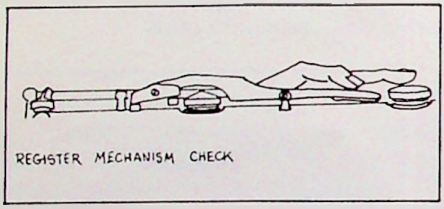
they are parallel to each other and equidistant from the body. They must not hit the body.



Register Lever:

Oil rocker and hinge screw and mount lever. Check feel and tension.

With register lever depressed check opening and closing of both Automatic Register key and Automatic Bb key by activating thumb key, closed and open. All closing keys must be checked with feeler.



With the final visual check and feel of the overall action, this finishes the upper joint.

Before disassembling lower joint keys for repading and recorking, it is again most important to check original travel, straightening any bent keys and rough regulating with original pads still in keys.

This accomplished we may remove all lower joint keys and repad and recork following the procedure outlined in previous issues. Again check proper spring bending and tension as removing keys may have altered proper bend and tension. A good rule of thumb is to put a little more tension on all springs before reassembling because springs can be easily lightened after keys have been installed. In general, all closed keys can stand more tension to insure solid closing.

A good sequence for remounting the keys is helpful so that we're not working with certain keys blocking our view of others or hindering the mounting of groups of keys that follow.

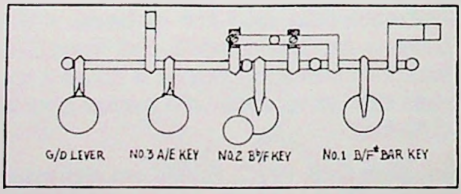
After repad and cork, start with the low Eb (bell key) lever. Mount the key after greasing pivot holes and make sure it falls free.

The next key in sequence is the F#/C# key. This is a closed key and demands a bit of spring tension. Follow covering and seating routine A explained in an earlier issue and wedge closed. Again a deep seated pad is not necessarily a well seated pad. The more carefully you have checked the covering of the cup the less heat you will need to apply to the cut.

You may now install the E/B key, follow seating procedure, and wedge.

The B/F# and G/D are next. Keep a heavy tension on the B/F#, as it is a closed key, and a light tension on flat spring of the G/D key. Seat the wedge.

When G/D has been cooled, remove wedge and proceed to mount lower stack.

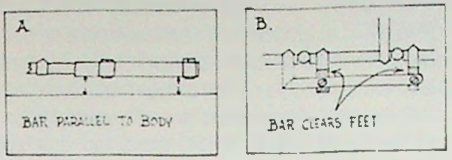


Clean and oil hinge screw and mount keys checking that they fall free before you hook the springs.

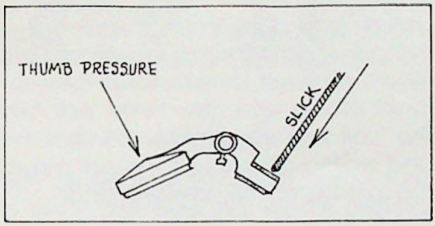
Begin seating lower stack with the B/F# bar key and wedge lightly under bar and connecting arm as you follow seating steps A on Bb/F and A/E keys.

After the lower stack has been seated check that bar on B/F# key is parallel to

body and clears feet on Bb/F and A/E keys.



We may now begin to check coordination between the bar key and Bb/F key. When B/F# bar key closes before the Bb/F key, lower the Bb/F key by depressing the cup with the left hand thumb. And, using a heavy slick over the foot, strike down with a mallet. This closes the angle between the cup and the foot.



This procedure may also be followed when coordinating A/E key with the B/F# bar key.

If you find that the bar key does not close when depressing either Bb/F or A/E key, you may close down bar key travel by holding its cup closed while bending down bar with flat nosed pliers.

(Note): I seldom use the adjusting screws on the bar key to coordinate the regulation unless I find equal amounts of leakage and lost motion between the keys. The adjusting screws are used mainly for emergency regulation.

After the three stack keys have been coordinated, check for lost motion between the feet. If any is found, remove by drawing a piece of fine sandpaper under foot cork on key that does not have lost motion.

Finally, check closing of previously seated G/D key with G/D lever.

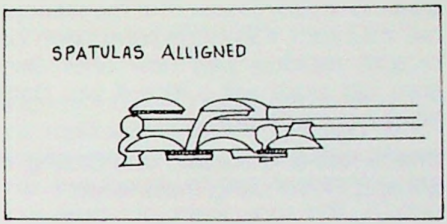
Lightly wedge the stack keys closed as you now return to remaining lower keys.

Remove wedges on the E/B and F#/C# keys.

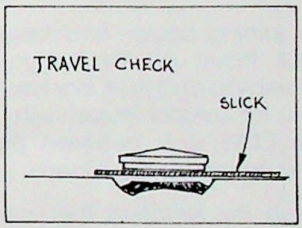
Mount the F/C lever and check feel.

Mount F/C (with crows foot) and Ab/Eb keys and follow seating procedure A.

With all spatula keys mounted and seated, check alignment of spatulas.



Check the travel on the F/C and E/B with .035 slick between pad and body.

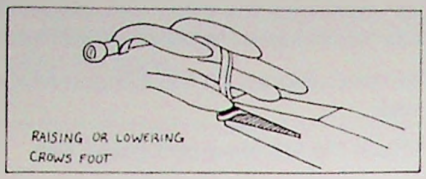


If travel is too high it is easy to lower by removing key and twisting cup down with one hand while holding spatula and arm down with the other.

If travel is too low, you may merely raise cup with flat slick while key is still on the body.

Check coordination between F/C and E/B with a feeler. If F/C cup leaks in coordination, place a heavy slick under crows foot and bend down the cup. If F/C cup closes first in coordination, place slick under pad and lift.

If the F/C key crows foot hits the body, place pliers on crows foot and at same time push inward and bend up to shorten stroke.



After doing any bending like this always return to check coordination between involved keys with a feeler.

We now mount the E/B and F#/C# auxiliary levers. Check that the silencers are still intact. If silencers have been lost or split, replace with new ones. Skins from old pads will suffice if you don't have regular silencers.

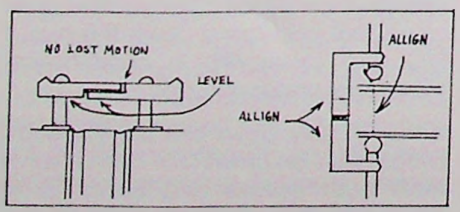
Check feel of auxiliaries and closing of E/B and F#/C# using these levers.

Check for lost motion between F/C lever and F/C crows foot key where it picks up foot. Remove or add cork as needed under foot of F/C lever.

Before joining upper and lower joints, recheck travel on Bb bridge key of upper section and B/F# bar key of lower section for proper travel with proper gauge (.035 slick between pad and body as previously explained).

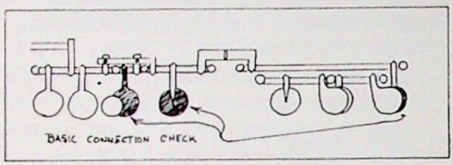
Regrease the tenon of the upper joint and join upper and lower sections with a twisting motion being careful not to run the connecting arms into each other. It will help to keep the upper stack depressed while making the connection.

Connecting arms on the Bb bridge key and the B/F# bar key should be checked for alignment along with post alignment.



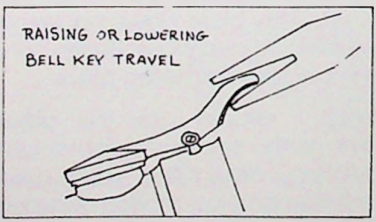
First align the posts by eye, then align the feet as necessary with flat nose pliers.

Check regulation of connection between B/F# bar key and Bb bridge key with feeler; when the no. 2 BbF is depressed, three keys must close at the same time (BbF, B/F#, and Bb bridge keys). There must be no lost motion on the pick up of the connecting arms. If there is lost motion, recheck travel on both upper and lower stacks. (Feeler drag can be slightly lighter on the Bb bridge key than on the Bb/F key to assure solid closing of the lower stack).



The bell key should now be mounted and seated after which the bell may be mounted onto the greased tenon.

Adjust the travel on the bell key so that it closes when the Eb spatula is depressed this should not change leveling of Eb, F/C or E/B spatulas. If leveling is changed, you may have to raise or lower the bell key arm with flat nose pliers.



These have all been general procedures under normal circumstances. You may run into isolated problems and situations depending on condition of the instruments you work on.

Repairing a Cracked Joint

The ideal humidity for any instrument with a grenadilla wood body is 50%. This is easily controlled in an area where instruments are stored but impossible to maintain for the musician who transports his horn from school to home, etc. where humidity and temperature run from one end of the scale to the other.

The conflict of moisture content inside the wood and humidity of the environment which it is exposed to create pressures that attack wood at its weakest point. Try to avoid great changes in temperature and allow slow warming if the horn is quite cold.

Do not play a cold horn. The warm, moist breath induces stress between the inner and outer walls of the instrument. Warm the wood with your hands for a few minutes — rubbing gently.

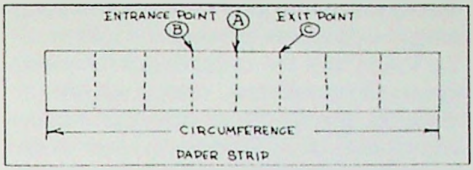
When you've finished playing make sure you swab the bore dry before putting the horn back in the case.

That is the ounce of prevention — now the pound of cure.

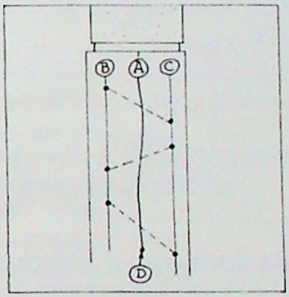
At Leblanc we prefer pinning a crack rather than banding. To close a crack with a band so much pressure must be exerted that the bore may become constricted and unless you can properly rebore the horn you may induce intonation problems. Most repair shops do not have proper bore reaming tools at their disposal. Proper pinning is not difficult and changes nothing in the blowing quality of the horn.

You'll need a #42 wood drill, which you can chuck into your bench motor, some #4-40 threaded rod which comes in 36" length from any Industrial Tool or Supply Company, a small broach, a bunsen burner or propane torch, and a center punch.

Remove all keys in the area of the crack and trace the course of the crack with a pencil. Now find the circumference of the joint by wrapping a strip of paper around it and mark and cut where the two ends meet. Fold the paper into eight parts. This strip of paper when unfolded gives you index points for entrance and exit when drilling for the pins.



Place point (A) of paper strip over crack and mark points (B) and (C) with a pencil on either side of the crack. Extend these lines the length of the crack. You are now ready to mark your drill (A) and target points (C) through the crack.



In this illustration you'll notice the drill points are on an angle and not straight across. This adds strength to the pinning.

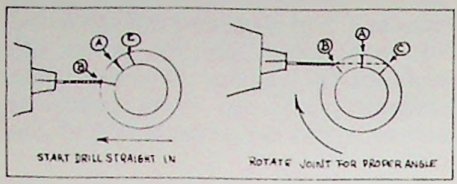
The number of pins installed depends upon the length of the crack. Three or four are usually sufficient.

Drill a shallow hole at the end of the visible crack (D). This hopefully will relieve the stress and stop further extension of the crack.

After you have marked your points for drilling, take a center punch and punch entry points so that the drill will not slip off the mark.

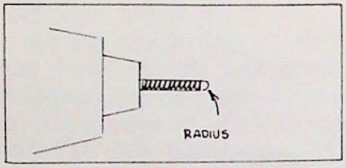
Chuck up your #42 drill and holding the body firmly with both hands start the drill straight into the wood until the point has

cleared the surface.

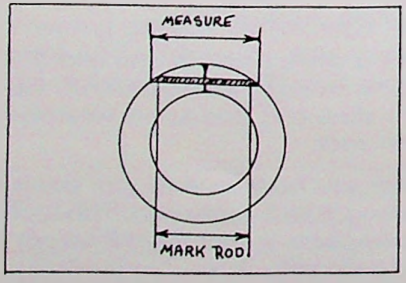


Slowly rotate the joint until proper drilling angle has been achieved. Care must be taken that the angle is not too deep or shallow as too deep will break through into the bore and too shallow may raise the wood on the outer surface. If possible practice the drilling on a scrap joint or piece of wood dowling. If the drill exits close to point (C) you have been on target and centered through the crack.

With all holes drilled you are ready to pin. Place a length of threaded rod into the chuck. Round off the end of the rod with a file.

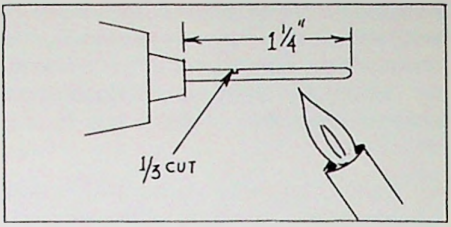


Insert a smooth round broach into the drilled hole and measure length of round you will need to be installed from point (A) to point (B) and subtract from that length just enough so that the ends of the thread stock will remain below the surface of the wood.



After needed length has been determined, cut 1/3 of the way through the threaded stock with a jewelers saw. This gives you a break-off point after the pin has been installed.

Pull the length of threaded pin out of the chuck about 1-1/4" in length and heat the threads to a dark blue color.



With the motor running, run the hot pin into the drilled hole to the point where your 1/3 cut lines up with point (B) on the hole. Stop the motor and turn the chuck by hand until proper depth is achieved. Immediately twist the body to break off the rod where you made the 1/3 cut. If the installation was done correctly both ends of the pin should be below the surface and the holes left ready for filling.

To fill the drilled holes we mix a dark stick shellac (#47 Tuffy Patch Stick by M.L. Campbell Co., 2909 Chrysler Rd., Kansas City, Kansas 66115) with grenadilla wood shavings or dust. Heat up the shellac and mix in the wood dust until you get a grainly consistency. Let it cool as you form it back into a stick or tube shape.

With a hot slick you can pick off and fill all the holes made by the drilling. Press the shellac down into the hole and smooth the top to conform to the surface of the wood. Sand down flush with the surface and finish off with a very fine emory paper.

With some practice and patience you'll develop a touch for the whole operation.

The lower joint of the clarinet is seldom pinned because of the location of the 3rd ring holes and the usual occurrence of the crack. The Bass Clarinet poses special problems because of the neck tenon on some models.

Emergency Repairs

When a player approaches you with a problem horn, ask him or her some obvious questions.
When did you first notice the problem?
Was the horn dropped or bumped?
Was the case dropped with horn inside?
Was the problem small at the onset and did it grow progressively worse?

Then try to pinpoint the problem.
Does the horn refuse to play at all?
At what point in the scale do the notes become stuffy or don't respond properly?
Does extra finger pressure help the problem?

If the horn refuses to play with all keys in open position, check for an obstruction in the bore. Many times something will become blocked in the bore and by checking for it immediately, we can save a lot of wasted time.

If the horn plays only the highest notes and refuses to play any left hand notes, check all the closed keys. Very often, trill keys on flutes, palm keys and octave mechanism on sax, or A-G# and trill keys on clarinet, will develop leaks because of loose or off-center pads, or broken or displaced flat or round springs. These high closed keys must cover the hole perfectly, otherwise increasing resistance will be felt in descending to lower notes.

Look for the obvious before getting too involved.

Look for dents around exposed posts on the saxophone or flute. These dents will show up at the base of the post and result in an out-of-line pad cup over the socket. Straightening the post with a flat nose pliers or fiber mallet will often reset the cup and pad properly over the socket.

Look for torn pads or trapped lint or dirt around the seat of the pad.

Basic Tools:

1. Propane burner
2. Pad slick (flat piece of spring steel .025" thick) or butter knife with the end rounded.
3. Feeler gauge — this can be made by attaching a small strip of cellophane from a cigarette package to a suitable handle such as a wood match stick.
4. Small screwdrivers — file the tips to required width.
5. Pliers — round nose, flat nose, and side cutters.
6. Single edge razor blades.
7. Good pocket knife — (small).
8. Small fiber mallet.
9. Oil — key oil and penetrating.
10. Spring hook — crochet needle.
11. Cork cement, stick pad shellac.
12. Cork grease.
13. Small metal tack hammer — for flattening round springs.
14. Bench anvil.
15. Sandpaper — fine.
16. Assorted thicknesses of sheet cork.
17. Saxophone leak light — can be made with G.E. M.9, 125-130 volt indicator bulb, receptacle, a length of suitable cord and a plug.

How To Check for a Leak in a Single Key:

1. Leak light method (saxophone)

A lit bulb is inserted into the bore of the horn directly under suspect key. If there is a leak, light will appear between the pad and socket. Closed keys in closed position — open keys in closed position with only enough finger pressure to encounter resistance. Be sure to check front, back, and sides of each pad as it covers the socket. If a large leak is discovered, check the body for dents or a bent post, damaged key or loose pad.

2. Feeler guage method
(clarinet, flute, oboe)

Insert feeler between pad and tone hole and with finger pressure only on open type keys, pull the paper out slowly to check resistance or drag. Repeat this around complete circumference of the cups.

Methods of Eliminating Leaks in a Single Key:

1. Heat cup with burner and shift the pad with a pad slick.
2. Shim pad — heat cup, remove pad and place a paper shim in area of the leak. Then reinstall pad and check to see if leak has been removed.
3. With flat nose pliers, bend key at cup arm to remove leaks at either side of cup.
4. With pad slick placed directly opposite the leak and wedged between pad and tone hole, apply finger pressure to bend cup down over leaking spot.

Checking for Leaks in Key Combinations (two or more)

These methods apply generally to every type of padded instrument — clarinet, flute, saxophone and oboe.

The lower key in a two key combination is designed to close the key directly above it with the exception of the half step combination such as the Bb, Ab/G#, and F# keys.

In checking a two key combination, first check the closing of the upper key in the combination to see if it covers by itself. Then check lower key to see if either key is leaking. If lower key shows a leak all the way around the pad, you know it is being held open by the key above it. This is a regulation problem and you will have to either bend the adjusting arm or back out of the adjusting screw. If lower key is leaking only on one side, remove the leak as you would any single key, then tie it in with the key above.

Many other adjusting procedures are spelled out in our revised publication Care and Minor Repairs of the Clarinet for Band Directors. It contains many of the common problems you run into and their solution and may be ordered through Leblanc's Educational Department.

We also encourage the player to carry an extra set of pads for his or her particular horn. This practice guarantees that the right pad will be available when replacement is necessary.

In conclusion: Have the player see a qualified repairman once a year to check pads, regulation, etc. or whenever something in the horn is suspect. This is the best insurance against those unexpected emergencies that turn the band room into a trauma center.

Flute Repad and Regulation

An annual checkup is suggested for flute as it is for all woodwinds under constant playing conditions. Discrepancies in pad covering or regulation may be found at this time. These problems, small though they are, often are translated into an uncomfortable feeling for the player, a demand for more finger pressure, or a constant search for a center of the air stream.

In many cases a few minor adjustments are all that is necessary to return the instrument to its original playing condition. In some instances, a single torn or scuffed pad must be replaced. In still others, a complete pad replacement is in order and it is this choice that we will concern ourselves with.

Before beginning the repad make sure you have the proper set of pads for the flute you are going to work on. Correct diameter and thickness of the pad is all important. Paper shims of various thicknesses may also be necessary.

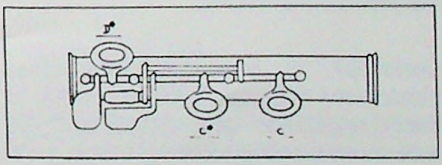
Disassemble the keys replacing pivot and hinge screws into their respective posts. Examine all foot and connecting arm corks or felts. (Caution: As you remove upper and lower stack keys, disengage springs from spring hooks carefully so that original tension is maintained.)

When disassembly is complete, lay keys out on table, pad side up, and begin to remove the pad retainer screw and washer. Lay screw and washer in front of its respective key to avoid a mix-up. Carefully remove pad and note placement of shims under the pad. These shims are used to build up height of pad and occasionally you will find a half shim to the front or back of the cup to level pad over the socket. Place these shims in order on table in front of its key for use when installing new pad. If the new pad set has been purchased from the factory, they are formed to specs and should be placed into the cup with original shims. If you can remove old pads without disturbing original shims — all the better.

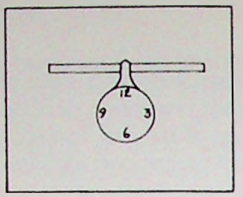
All pads, with the exception of the top C and the trill keys are installed dry (that is, without pad shellac or glue). When placing pads in cups and securing with washer and retainer screw, make sure pad is level as you tighten the screw down. After all large pads have been installed, remove small pads from High C and trill keys with heat. Clean inside cups and reheat to float pad shellac or stick glue into cup. Install pads while glue is still warm and finger level these pads (press in with equal pressure all around pad).

With all pads installed on body and foot joint keys we are ready for reassembly.

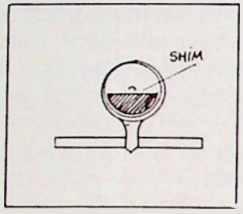
Foot Joint



Mount foot joint keys with small amount of oil on the hinge screw and hook up round springs. Check action of the keys. Level and center the cups over the sockets if necessary, and with feeler paper, check for light drag at 12-3-6-9 o'clock between pad and socket. Use very light finger pressure when checking pad covering.

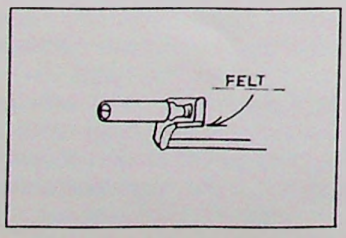


If the pad leaks slightly in the back (12 o'clock) place a pad slick at 6 o'clock and press down gently at back of cup. If the pad leaks too much at 12 o'clock remove key and place a half shim under leaking quarter. Removing the key and disassembling the pad to put in a shim seems like a lot of trouble but it will pay dividends in the long run.

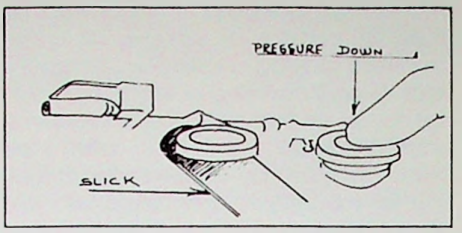


All the pads should cover well even before seating. Ideally the flute should play even before the impressions are pressed into the pads. Once an impression is put into a pad it's virtually impossible to shift a pad or bend a cup to remove a leak without misaligning the seat on the socket.

Once D#, C and C# pads close individually on foot joint, it's time to check regulation between C and C# cups by depressing roller on C key. If C# key closes first — check thickness of felt on the C key roller arm. If too thick replace with thinner felt.

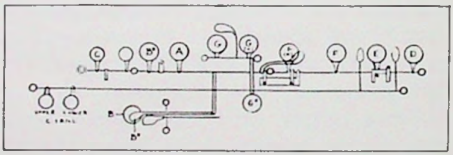


If C key closes first, place slick under C# key cup and press down on C key cup.



We may now proceed to seat pads on foot joint. Dip a special flute pad slick (check instrument repair tools) in water and moisten the three pads. Place the same slick (warmed slightly over burner) between pad and socket and iron pad to remove any wrinkles. Immediately heat cup with burner and close key with pressure of mallet head. Wedge or spring clip keys closed and allow to cool as you proceed to body assembly. Final regulation of the foot joint is done in the manner we used initially in checking coverage.

BODY ASSEMBLY



The sequence for assembling body is thus:

G# key, G and G helper key, trill keys, lower stack, upper stack with high C key, B and thumb Bb side keys.

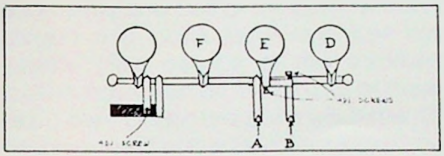
G# key is an independent key and we follow usual key check — feeler paper, re-shim if necessary, recheck with feeler, moisten, iron, heat and wedge.

The G and G helper keys are mounted on a single tube and must close together. With a flat slick under the G helper press down on the G key. This

enables the assembler to check the G key alone without interference from the G helper. Follow procedure for removing leaks on G key — moisten and iron. With flat slick under G key depress G helper (reverse of above) and remove leaks, moisten and iron. Regulate G and G helper together with flat slick procedure. Heat both cups and wedge shut.

The trill keys are checked as individual keys with feeler paper, moistened with flat slick, heated and seated with pressure of mallet head.

The lower stack is then mounted. Back out all adjusting screws so that key cups will close alone.



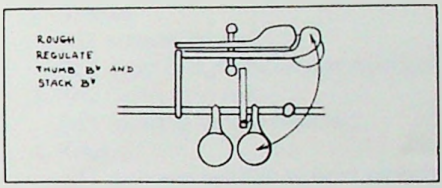
All keys on the lower stack should be checked individually, moistened ironed, heated, seated and clamped.

Regulating key combinations in the lower stack (F to F helper, E to F helper, D to F helper) is done with the adjusting screws that you backed out before seating. Turn the screws in slowly and check with feeler paper until keys close together in these combinations.

If in disassembly, you have changed any foot corks on the lower stack it's time to check the travel of the lower stack. The travel or opening of both upper and lower stacks is goverened by the opening on the F key. This travel should be no less than 7/64ths and no more than 10/64ths. Remove cork on F key foot to get this reading. Check for lost motion on the E or D key. Lost motion may be removed by drawing a thin piece of sand paper under corked feet of either key which does not have lost motion.

The upper stack is now mounted with high C key. Back out A key adjusting screw as you did on lower stack and proceed to level C key, Bb key, and A key. Follow seating procedure and clip keys closed to cool. When cool, run adjusting screw back in to coordinate Bb and A keys.

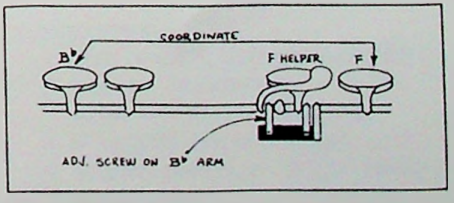
Mount side B key alone with hinge screw and check pad all around with feeler for covering. If pad covers well, pull the hinge screw out partially and slip thumb Bb lever into position and turn screw in. Rough regulate thumb Bb and stack Bb.



Remove thumb Bb again and seat B key with heat. After it cools remount thumb Bb and fine regulate with Bb stack key. Rewedge.

FINAL REGULATION

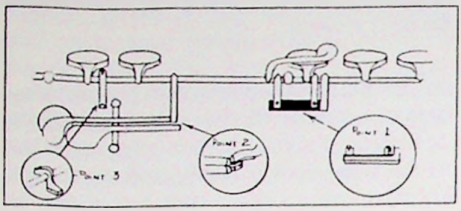
To begin the final regulation we must first coordinate the F, F helper (lower stack with the Bb (upper stack). The adjusting screw on the Bb foot is used to make this regulation.



Recheck all regulation points:

1. Lower stack key coordination
2. Upper stack key coordination
3. Lower stack F key bridge to upper stack Bb
4. Side B, Bb to Stack Bb

Last of all — check for lost motion at three points illustrated below.



Examples of lost motion and their corrections:

A. If point #1 and #2 have L.M. sand point #3 foot.

B. If point #1 and #3 have L.M. sand point #2.

C. If only point #1 has L.M. bend down arm of Bb, then adjust thumb Bb lever to close B and Bb.

If you've followed these instructions slowly and patiently, the flute should pop that crystal wine glass or clear all seven of your nasal cavaties.

Saxophones — The Quicky Repair

No other instrument, it seems, is subjected to as much abuse as the saxophone. Its defenseless body is scratched, dented, bumped, and on occasion dropped. Its shining lacquer is rubbed and eaten away by acid and its soft pliable pads are hardened and crusted with, as Andy Griffith used to say, "I don't know what all".

Seriously we will devote this section to the "quicky repair" of saxes (leak light check and playing condition).

Your first step in a playing condition repair is to generally check the neck, body, bow and bell of the horn for dents around any posts, bow and bell key guards. (The demise of the soldered sockets has taken all the fun out of these jobs.) Bent or dented posts will throw off the alignment of the keys and should be straightened or de-dented. Bent key guards sometimes restrict the opening of the keys and should be straightened out.

Next a general check of pad condition is in order. Check for ripped, hardened or crusted pads. It takes far less time to change a very hardened pad than it does to try to make the old one cover the socket. This is especially true on the palm keys (D, D# and F) and the upper stack (B and B helper keys). Another important pad to check carefully is the G# between the upper and lower stack.

It is a little harder to replace, sometimes involving the removal of keys, but well worth the trouble in the long run.

Pad removal and installation is much easier with the advent of the epoxy lacquer and plated keys. No more do we worry about burnt lacquer when heating a cup.

Needless to say a similar thickness replacement pad is essential to negate a lot of readjustment and regulation of the key combinations.

Pads in fair condition can also be reconditioned with a solvent or cleaner and softened with a skin lotion containing lanolin.

It wouldn't be a bad idea to have a check list as a reminder to check the following points:

1. Spring Action
   (a) secure in post
   (b) proper tension and bend
2. Screws
   (a) secure in post
   (b) drop of light oil where needed
3. Key Corks and Felts
   (a) replace where needed
4. Keys
   (a) remove excessive end play or wobble
   (b) check for feel and free action

We at Leblanc have had great success with a leak light we've been using the last few years. Its a small fluorescent lamp that slides inside the sax and lights up a greater length of bore than the conventional leak light bulbs generally in use. It handles a lot more abuse and is much brighter.

If you are handy you can assemble one for your own shop or take the following components and diagram to an electrical shop and have one made up for you.

Components:

1. Bulb — GE F6T5 Fluorescent lamp
2. Daffron Transformer — 6-8W .158 Amp. — .118V — 60 CY-AC
3. 4" square box and cover
4. Toggle switch — single throw — single pole

5. Starter FS-5 and starter plug
6. 8 foot 4 wire — (18-4) rubber covered cord
7. 6 foot 3 wire rubber covered cord
8. 1 grounded plug

Four holes must be drilled in the box cover as shown in figure I.

FIGURE I

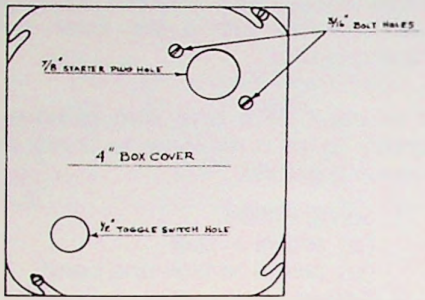


Figure II shows the side view of the box cover with starter plug and toggle switch installed.

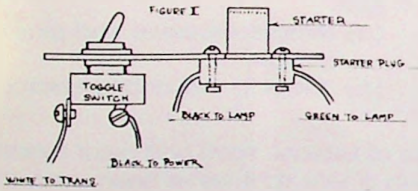


Figure III shows the transformer which is placed diagonally and loose in the box.

FIGURE III

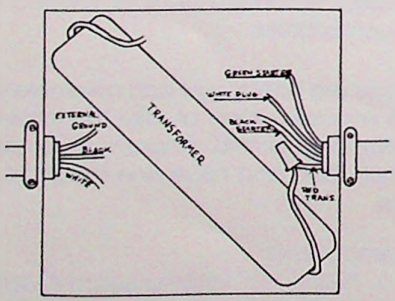
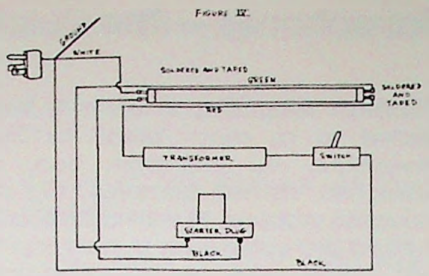


Figure IV is the wiring diagram (note that the green wires run back on the outside of the lamp and are taped firmly at both ends).



Having run a general check on the condition of the horn, we are ready to check the pads for covering with a leak light.

Start the leak test at the top of the horn, placing the leak light in the bore and positioned under the socket of the highest key (F#, if it has one). Open and close the key while checking front, back and both sides of the pad for any trace of light seeping between pad and socket. If a leak is found, there are three ways to remove it:

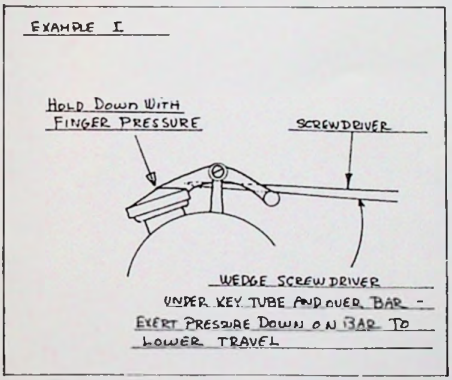
1. Heat the pad cup and slightly shift the pad with a slick.
2. If the leak is on either side of the pad, use a flatnose pliers on the cup arm and twist arm gently in the direction of the leak.
3. Place thin flat slick between the pad and socket — opposite leak and finger pressure down on the cup over point of leak.

Follow this leak light procedure through the High E, palms (D, D# and F) and side Bb and C keys.

Occasionally, you will find a pad that will leak both front and back at the same time. Open the key and check the level of the socket. If you find the flat of the socket has dips in it, remove the key and lightly file the face until it is level.

Both upper and lower stacks have bar keys (B bar-upper and F bar-lower). On some models, these bar keys have adjusting screws positioned over the feet of the keys which close them. These adjusting screws facilitate easy coordination between involved keys. On other models, the bar keys have no adjusting screws, and regulations between involved keys must be made by raising or lowering the angle between the cup and foot of the key. As an example:

On the upper stack, if the B key (1st finger L.H.) does not close the B helper (bar key), either raise the travel of the B key until it closes the bar key or lower the travel of the bar key until the two coordinate in closing.

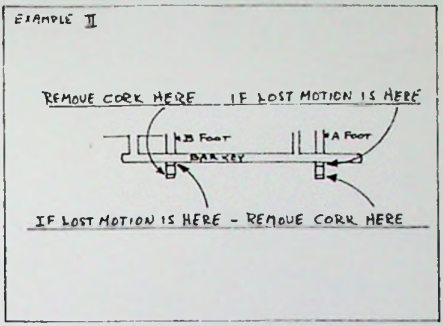

EXAMPLE I
HOLD DOWN WITH FINGER PRESSURE
SCREWDRIVER
WEDGE SCREWDRIVER UNDER KEY TUBE AND OVER BAR - EXERT PRESSURE DOWN ON BAR TO LOWER TRAVEL

If, on the other hand, the B helper closes before the B key, either raise the travel on the B helper by raising the bar or close down the travel on the B key. To close the travel on the B or A key, hold the key shut and wedge a screwdriver

under the tube and exert pressure down over the bar where it is positioned over the B or A key foot (as in example I drawing).

A similar procedure is employed in the lower stack.

Do not try to remove any lost motion between keys until closing is achieved in key combinations. Lost motion is eliminated by the addition or the removal of the cork where the foot sits on the body.



When we say addition of cork, we don't mean adding cork to existing cork; we mean replacing original cork with a thicker than needed cork which can then be trimmed to the necessary thickness to remove lost motion.

As you check the closing of the key combinations, you'll find the one most important to be very careful of is the G#, F helper and F key combination. First check that the G# closes well after the G# table spatula-L.H. is released. Next, open the G# with the table spatula-L.H. and check that the F (R.H. 1st finger), F helper and G# all close together.

Remember that light finger pressure, while closing the keys to check for leaks, is essential.

For the sake of brevity, we haven't become too involved with some of the finer points of regulation and for those of you who have specific questions or problems you would like to bring up, please feel free to write us and we can discuss them in upcoming articles.

D-140
Leblanc Educational Publications
Instrument care booklet

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